

## A new genus and species of goby from the Swan-Avon Estuary, Western Australia, with a redescription of the genus *Favonigobius* Whitley, 1930

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### Abstract

A new genus of gobiid, *Papillogobius*, is described from specimens collected in the Swan-Avon Estuary, south-western Australia. The genus *Favonigobius* Whitley, 1930, is redescribed. The type species of the two genera, *Papillogobius punctatus* sp. nov. and *Favonigobius lateralis* (Macleay, 1881), are described and redescribed respectively. *Favonigobius exquisitus*, *Favonigobius melanobranchus* and *Favonigobius reichei* are placed in the new genus on the basis of several shared osteological and morphological characters. The characters used to distinguish the new genus from allied genera are also discussed.

### Introduction

Gobies (Gobiidae) are a ubiquitous and abundant component of the teleost fauna of the Swan-Avon and Peel-Harvey Estuaries of south-western Australia (Chubb *et al.* 1979; Potter *et al.* 1983). During a study on the distribution, abundance and biology of the various species of gobies in the Swan-Avon Estuary initiated in 1983, by one of us (HSG), it became apparent that the taxonomy of the various species found in the system required attention. Although Chubb *et al.* (1979) recorded *Favonigobius lateralis* (Macleay, 1881) in moderately large numbers throughout the estuary, a subsequent more rigorous quantitative analysis by one of us (HSG) showed that individuals assigned to this species were represented by two morphologically distinct forms. One form was caught in very large numbers in the lower estuary and to a lesser extent in the middle estuary, whereas the other was found predominantly in the upper estuary. Examination of scale and fin ray counts and coloration revealed that specimens captured in the upper estuary were an undescribed species distinct from *F. lateralis*. Further comparisons of the osteology and cephalic lateral line system of the undescribed species showed that it shares several characters with *Favonigobius exquisitus*, *Favonigobius melanobranchus* and *Favonigobius reichei*. However none of these characters are found in either the other members of *Favonigobius* or the closely related genus *Acentrogobius*.

Whitley (1930) erected the genus *Favonigobius* without description, merely referring to the original brief description of *Gobius lateralis* Macleay, 1881 when proposing this as the type species for the new genus. For generic characteristics the reader was directed to the key to Australian gobiids by McCulloch and Ogilby (1919). No subsequent

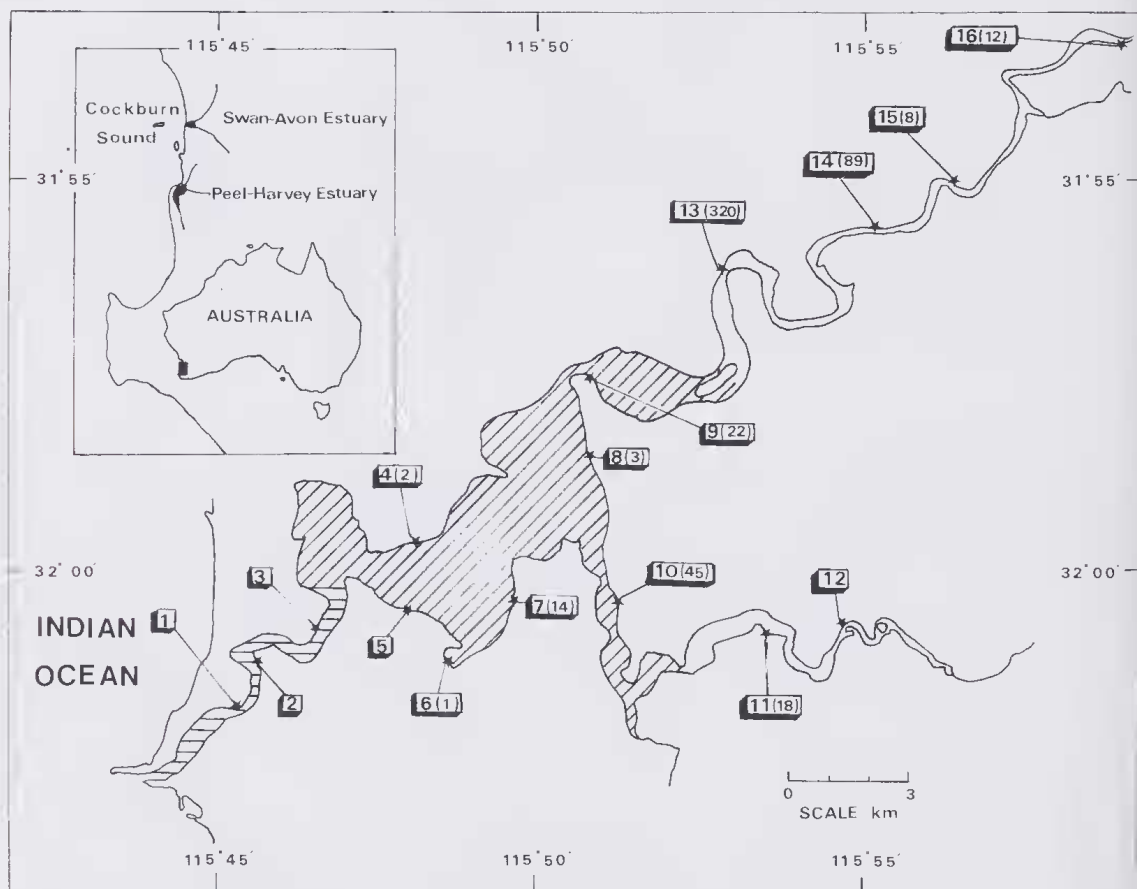
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description of the genus, based on the type species, is available, rendering assignment to the genus very difficult and often questionable.

This paper describes a new genus and species of goby from the Swan-Avon Estuary (Figure 1) and redescribes the genus *Favonigobius* and its type species *F. lateralis*.



**Figure 1** Location of sampling sites in the Swan-Avon Estuary, number of *Papillogobius punctatus* caught in parentheses. Lower estuary horizontal hatching, middle estuary oblique hatching and upper estuary clear, estuarine regions are those of Chalmers *et al.* (1976).

Sites as numbered are: 1. Stirling Bridge; 2. Leeuwin; 3. CSR; 4. Dalkeith; 5. Burke Drive; 6. Alfred Cove; 7. Applecross; 8. Kwinana Freeway; 9. Point Belcher; 10. Mount Henry; 11. Shelley; 12. Kent Street Weir; 13. Joel Terrace; 14. Garret Bridge; 15. Sandy Beach; 16. Guildford School.

### Materials and Methods

The methods used for counts of meristic characters and derivation of pterygiophore formulae follow those of Akihito *et al.* (1984). Vertebral counts and osteological examination were undertaken after clearing and staining the specimens, using the

**Table 1** Characters used to distinguish between *Papillogobius*, *Favonigobius*, *Acentrogobius viridipunctatus* and *A. janthinopterus*. Data for the osteological characters of *A. viridipunctatus* and *A. janthinopterus* were taken from Hoese and Winterbottom (1979), Murdy (1983) and Hoese (1983). Dashed lines indicate character not known.

Character	<i>Papillogobius</i>	<i>Favonigobius</i>	<i>Acentrogobius viridipunctatus</i>	<i>Acentrogobius janthinopterus</i>
<b>Skeleton:</b>				
branchiostegal ray 2	much broader than 3 & 4	approx. eq. to 3 & 4	approx. eq. to 3 & 4	approx. eq. to 3 & 4
lateral proc. of cleithrum	large, TS T-shaped	variable, not T-shaped	reduced/absent	reduced/absent
symplectic process	well devel. to symp.	small, never to symp.	absent	absent
ectopterygoid	short	long	—	—
ventromed. strut	no foot	small foot	—	—
of exoccipital hyomandibular sheet	absent/reduced	present	—	—
<b>Fin rays:</b>				
D2	1,8	1,9	1,10	1,10
A	1,8	1,9	1,9	1,8
P	15-16	14-17	18-19	17
<b>Scales:</b>				
LL	26-32	26-34	31-38	30
TR	7-7+1	7-9+1	10-13	10
PD	0-10	0-8	24-34	17
operculum	absent	absent	present	present
<b>Cephalic lateral line:</b>				
row a	long	short	long	long
row cp	long	short	long	short
rows a, c and cp	disorganised	single	transverse proliferation	single
row e	variable	broken	continuous	broken
row i	broken	broken	continuous	broken
rows e & i	single	single	disorganised	single
row f	longitudinal	transverse/longitudinal	longitudinal	transverse/longitudinal
row n	single	single	transverse proliferation	transverse proliferation
rows oi, os & ot	long	short	long	long
row x	usually present	absent	present	present
rows x1 & x2	contiguous/small break	separate	contiguous	contiguous/small break
Maximum SL (mm):	<80	<80	100-250	100-250

method described by Dingerkus and Uhler (1977). Bones of the suspensorium, cranium, girdles and vertebral column were examined in detail after dissection and/or disarticulation in a heated solution of 5% KOH. Nomenclature of the bones follows Springer (1968) and Birdsong (1975).

Fixation in Bouin's fixative for 24 hours greatly facilitated examination of the cephalic lateral line system. Description of the cephalic lateral line system, morphometric measurements and staining and description of scales follow those of Miller (1969, 1975, 1984). Terminology of the cephalic lateral line system follows that of Miller (1986) modified from Sanzo (1911).

Measurements were made to the nearest 0.1 mm (interorbital nearest 0.01 mm) with dial calipers. Illustrations were prepared with the aid of a Wild M8 stereo-microscope and drawing tube attachment.

Comparisons of selected characters of some related genera are presented in Table 1. The characters examined are given in Tables 2-5 and Figures 2-10.

Material from the following institutions was examined: the Australian Museum, Sydney (AMS); Gulf Coast Research Laboratory Museum, Ocean Springs, Mississippi (GCRL); Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RMNH); J.B.L. Smith Institute of Ichthyology, Grahamstown (RUSI); Western Australian Museum, Perth (WAM). Additional material from the personal collection of one of us (PJM) was also examined.

## Systematics

### *Papillogobius* gen. nov.

#### Type species

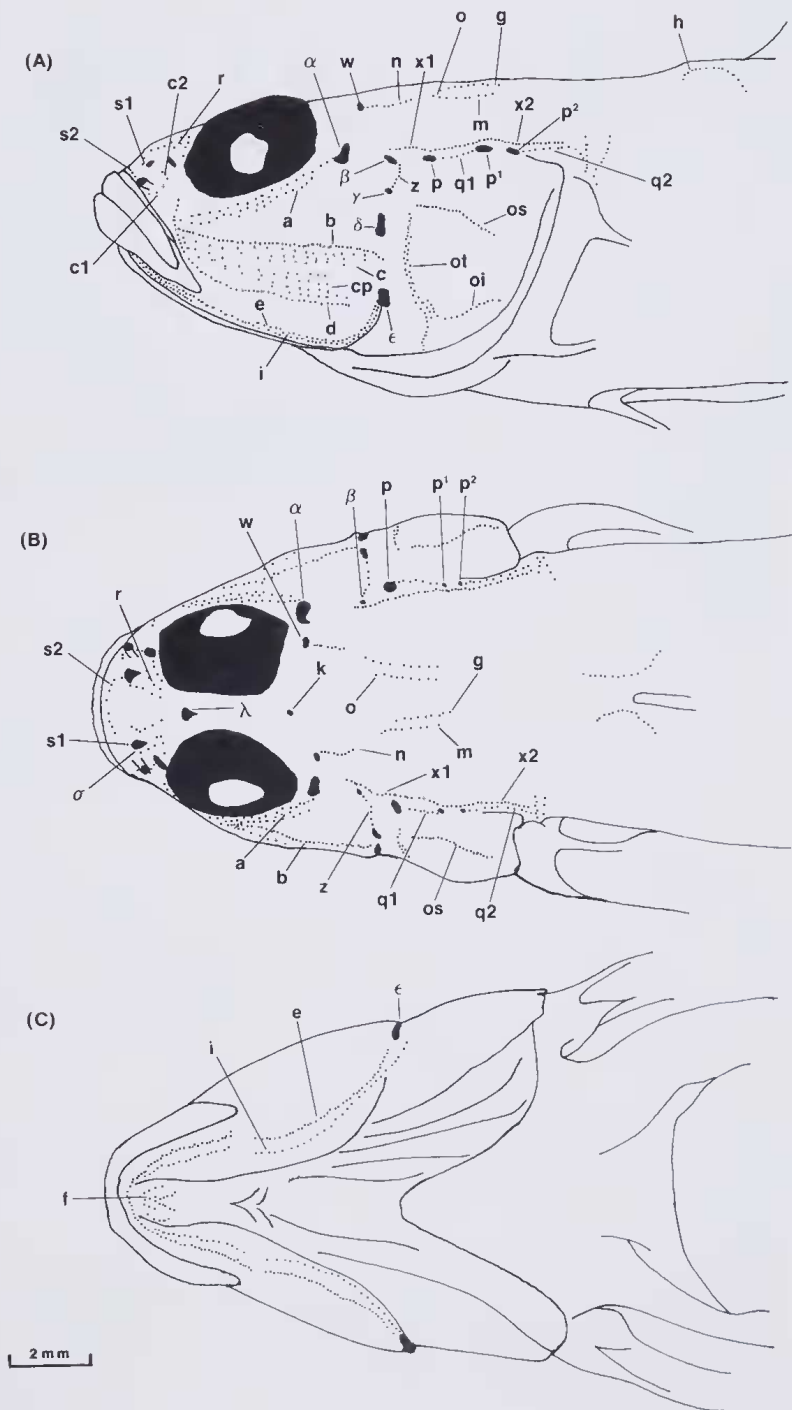
*Papillogobius punctatus* sp. nov. (see below).

#### Diagnosis

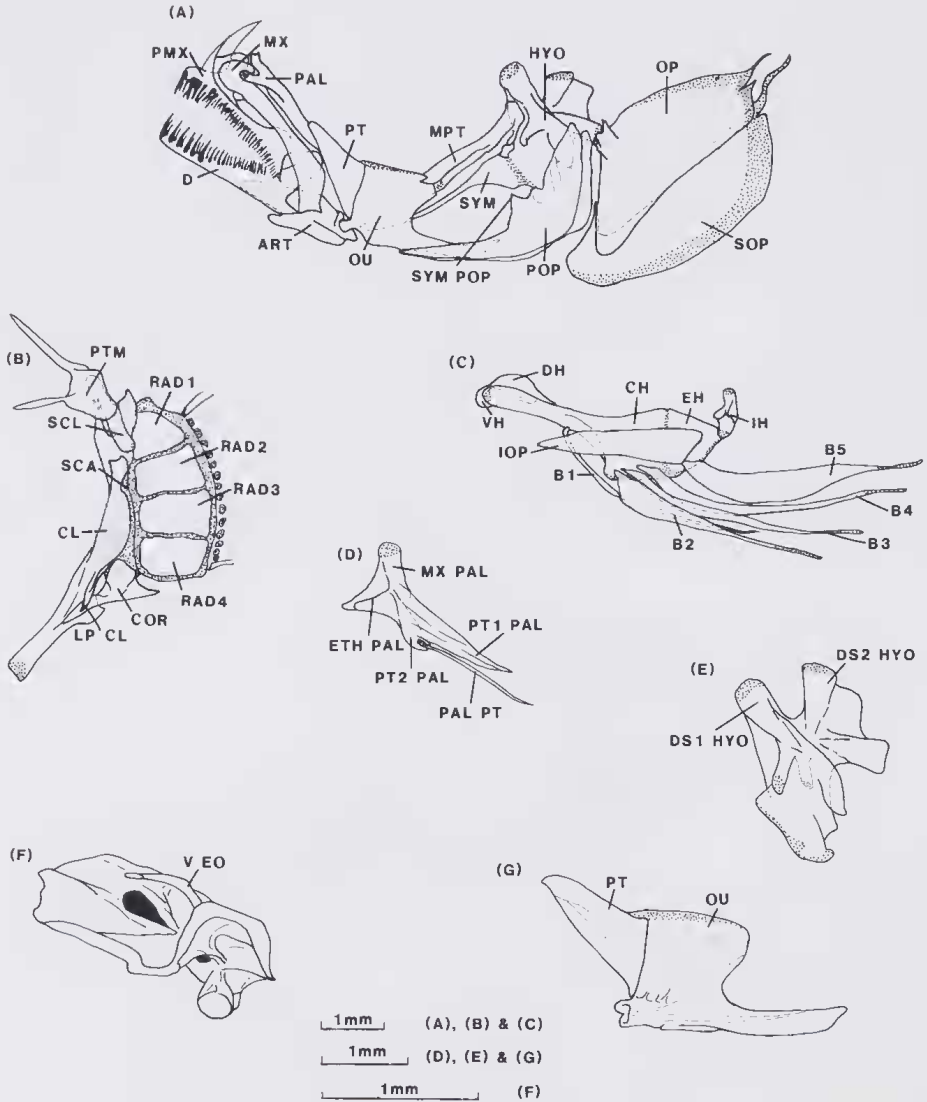
A genus of the subfamily Gobiinae, distinguishable from related genera possessing a longitudinal cephalic lateral line system by the presence of a large second branchiostegal ray and a cleithrum with a large lateral process. The genus also differs from related genera by the following combination of characters: operculum and preoperculum without scales or spines; first spine of dorsal and anal fins not strengthened; rows a, c and cp of cephalic lateral line system multiple and disorganised; rows b and d long and single; row e single; row n single and longitudinal; row ot proliferated; rows x1 and x2 contiguous or with small break; row x usually present; dark bar from eye to middle of upper jaw; caudal fin round.

#### Description

Body moderately elongate. Eyes dorso-lateral; interorbital space about one eighth to one quarter eye diameter. Second ray of first dorsal fin often greatly extended and free at tip; first and third rays occasionally extended and free at tips. Second dorsal and anal fins with eight soft branched rays. Caudal fin rounded, usually shorter than head, occasionally longer in males. Caudal peduncle deep in mature adults. Pectoral fins without free rays. Pelvic disc complete, posterior edge usually covering anus in females and genital papilla in males; anterior membrane complete and well developed. Lateral series with 26-32 ctenoid scales. Predorsal scales 0-10, ctenoid and cycloid and of variable size. Prepelvic scales large and cycloid. Belly scales small and cycloid, sometimes absent



**Figure 2** Cephalic lateral line system in *Papillogobius punctatus*, female, 41.7 mm SL, (A) lateral view; (B) dorsal view; (C) ventral view.



**Figure 3** Skeleton of *Papillogobius punctatus*, female, 32.2 mm SL, (A) suspensorium, lateral view; (B) pectoral girdle, lateral view; (C) branchiostegal rays, lateral view; (D) palatine, ventral view; (E) hyomandibular, lateral view; (F) exoccipital, dorsal view; (G) quadrate and ectopterygoid, lateral view.

Abbreviations used in Figures 3 and 7: ART. articular; B. branchiostegal; CH. ceratohyal; CL. cleithrum; COR. coracoid; D. dentary; DH. dorsal hypohyal; DS1 HYO & DS2 HYO. dorsal struts of hyomandibular; EH. epihyal; EO. exoccipital; ETH PAL. ethmoid process of palatine; HYO. hyomandibular; IH. interhyal; IOP. interopercle; LP CL. lateral process of cleithrum; MPT. metapterygoid; MX. maxilla; MX PAL. maxillary process of palatine; OP. opercle; PAL. palatine; PMX. premaxilla; POP. preopercle; PT. ectopterygoid; PTM. posttemporal; PT1 PAL & PT2 PAL. ectopterygoid processes of palatine; QU. quadrate; RAD. radial; SCA. scapular cartilage; SCL. supracleithrum; SOP. subopercle; SYM. symplectic; V EO. ventromedial strut of exoccipital; VH. ventral hypohyal.

in mid-line. Head, opercle and cheek naked. Anterior nostril tubular, without tentacles; posterior nostril pore-like, near orbit. Mouth oblique; jaws subequal, posterior angle of lower jaw between anterior edge of orbit and pupil; chin without barbels or transverse fold. Teeth in jaws erect and caniniform, in several rows medially, outer row of teeth in both jaws enlarged; pharyngeal teeth caniniform. Tongue truncate to slightly notched. Branchiostegal membrane attached to lateral margin of isthmus to about level of coracoid bar, membranes meeting between posterior quarter of eye and anterior quarter of operculum. Gill rakers simple to serrate on first arch, spinulose on rest.

Cephalic lateral line system with anterior and posterior oculoscapular canals carrying pores  $\sigma$ ,  $\lambda$ , k, w,  $\alpha$ ,  $\beta$ , p,  $p^1$ ,  $p^2$ , and the preopercular canal carrying pores  $\gamma$ ,  $\delta$ , and  $\epsilon$  (Figure 2). Cheek sensory papillae in seven single or multiple rows; row a proliferated and extending from pore  $\alpha$  to row b; row a1 absent; row b extending from row c to pore  $\delta$  or just below it; rows c and cp transversely proliferated and disorganised; row d extending from row c to distal quarter of cheek; posterior extent of rows c, cp and d all similar and often reaching preopercular canal; row i with break posterior to level of mouth; row e with break or continuous; row f longitudinal, proliferated and disorganised; row ot often proliferated and disorganised and extending to above level of pore  $\delta$  and often to pore  $\gamma$ ; row oi extending from row ot to edge of opercle; row os extending from top of row ot to at least distal quarter of opercle and often to opercular margin; rows x, x1 and x2 contiguous or with small break between rows x1 and x2 (specimen in Figure 2 with abraded/short row x) and extending from pore  $\alpha$  to above posterior margin of operculum; rows q1 and q2 single; row n short and longitudinal; row s1 a single papilla, rarely two or three; row s2 short single row.

Skeleton possesses characters diagnostic of the subfamily Gobiinae as described by Miller (1973) (Figure 3). Ventromedial strut of exoccipital (V EO) without expanded foot. Metapterygoid (MPT) and symplectic (SYM) fused; tip of metapterygoid overlapping quadrate (QU). Symplectic cartilage bound to hyomandibular (HYO) and preopercle (POP). Sheet of bone between dorsal struts of hyomandibular greatly reduced or absent. Head of palatine bearing additional, posteriorly projecting strut (PT2 PAL). Ectopterygoid (PT) broad and short, reaching halfway to head of palatine; medial process (PAL PT) firmly bound to PT2 PAL. Symplectic process of preopercle (SYM POP) large, occasionally reaching to symplectic. Second branchiostegal (B2) noticeably larger than branchiostegals three and four (B3, B4). Cleithrum (CL) bearing pronounced lateral projection (LP CL); projection T-shaped in cross section distally.

### Etymology

The genus *Papillogobius* is named after the disordered state of papillae rows c and cp.

### *Papillogobius punctatus* sp. nov.

(Figure 4)

### Holotype

WAM P.29724-001, male, 51.1 mm SL. 3 mm mesh beach seine on sand flats, depths to 1.5 m, Joel Terrace, Swan-Avon Estuary, WA, collected by H.S. Gill.

### Paratypes

Nineteen specimens, collection method as for holotype; WAM P.29723-001 (5 females, 38.8-42.7 mm SL), Sandy Beach, Swan-Avon Estuary, WA; WAM P.29725-001 (1 female, 38.5 mm SL) Joel Terrace, Swan—Avon Estuary, WA; WAM P.29726-001 (5 males, 40.5-52.9 mm SL), Joel Terrace, Swan-Avon Estuary, WA; WAM P.29727-001 (1 male, 42.7 mm SL), Joel Terrace, Swan-Avon Estuary, WA; WAM P.29728-001 (2 males, 43.9-45.2 mm SL), Point Belcher, Swan-Avon Estuary, WA; WAM P.29737-001 six cleared and stained specimens, Joel Terrace, Swan-Avon, Estuary, WA; AMS I.29327-001 (1 male, 45.2 mm SL, 4 females, 36.3-44.2 mm SL), Joel Terrace, Swan-Avon Estuary, WA.

### Additional Material

Seventy two specimens (32 males, 27.0-46.7 mm SL, 40 females, 29.0-51.3 mm SL), Swan-Avon Estuary, WA. 52 were cleared and stained for osteological examination.

### Diagnosis

A species most similar to *Favonigobius exquisitus* but distinguished from it by the branchiostegal membranes meeting below the rear of the preopercle, the heavy branchiostegal pigmentation, the large separation in row e and the small predorsal scales. This species differs from other members of *Favonigobius* with a similar papillae pattern by a combination of the following characters (mode in parentheses): predorsal scales 0-7 (2); scales in lateral row 27-31 (30); gill rakers 1-2 + 8-9 (1+8, 2+8); cephalic lateral line rows x1 and x2 contiguous with no small break; snout steep; bar from eye to upper jaw at 60° to mid body line.

### Description

Body proportions are given in Table 2; other features as for genus. Body moderately elongate, laterally compressed towards tail and highest at middle of first dorsal fin. Caudal peduncle deep in mature fish. Postorbital profile shallow. Snout oblique, shorter than eye diameter.

Fin ray and scale counts are given in Table 3. First dorsal fin (D1) arising above proximal third of pectoral fin; last ray arising above distal quarter of pectoral fin; D1 II and occasionally D1 I and D1 III may be free at tips and extending to caudal peduncle, D1 II always longest. Second dorsal fin (D2) commencing above anus; last ray just anterior to vertical of last anal ray and tip extending to upper origin of caudal fin. Anal fin commencing below D2 1/2; tip of last ray occasionally extending to lower origin of caudal fin. Pectoral fin extending to between D1 VI and D2 I.

Branchiostegal membranes meeting below rear of preopercle.

Predorsal scales very small, indistinct and variable. Belly scales small and cycloid, often absent in medial region.

*Colour:* Preserved specimens light to dark brown dorsally, pale ventrally. Lateral series bearing five dark large blotches; individual blotches appearing as three distinct spots in juveniles; smaller blotches may be present between first three main blotches. Trunk bearing five to seven longitudinal rows of pale yellow/brown spots. Triangular dark bar from eye to anterior nostril. Dark bar from eye to upper jaw at angle of 60° to mid line; dark bar from eye to above level of preopercular margin. Large triangular blotch covering anterior dorsal portion of opercle; posterior edge bearing line of pale yellow/brown spots. Branchiostegal membrane pigmented (Figure 5). Dorsal fins with



**Table 2** Body proportions of *Papillogobius punctatus* from the Swan-Avon Estuary. Individual values are given for the holotype. Range and, in parentheses, mean  $\pm$  standard deviation are given for paratypes.

Abbreviations used in Tables 2 and 4: Ab. anal fin base; Ad and Aw. body depth and width at anal fin origin; C1. caudal fin length; CHd. cheek depth; CP and CPd. caudal peduncle length and depth; D1b and D2b. first and second dorsal fin bases; D1/2 distance between last ray of first dorsal fin and first ray of second dorsal fin; E. eye diameter; H and Hw. head length and width; I. interorbital width; P1. pectoral fin length; PO. postorbital length; SL. standard length; SN. snout length; SN/A and SN/AN. distance from snout to verticals of anal fin origin and anus; SN/D1 and SN/D2. distance from snout to origins of first and second dorsal fins; SN/V. distance from snout to vertical of pelvic disc origin; V/AN. distance from pelvic disc origin to anus; Vd body depth at pelvic disc origin; V1. pelvic disc length.

Sex	Holotype, Male	Males (incl. holotype)	Females
SL(mm)	51.1	40.5-52.9	36.3-44.2
n	—	10	10
%SL,			
H	23.7	23.5-26.0 (24.3 $\pm$ 0.79)	23.9-25.3 (24.5 $\pm$ 0.38)
Hw	14.2	12.3-14.2 (13.3 $\pm$ 0.58)	10.6-11.8 (11.5 $\pm$ 0.37)
Mw	11.2	9.2-11.2 (10.4 $\pm$ 0.56)	8.2-10.0 (9.0 $\pm$ 0.60)
SN/D1	31.5	30.8-34.5 (32.7 $\pm$ 1.23)	33.1-35.3 (33.8 $\pm$ 0.70)
SN/D2	51.7	50.4-54.1 (51.9 $\pm$ 1.14)	51.1-55.2 (54.1 $\pm$ 1.22)
SN/AN	49.3	49.1-52.1 (50.5 $\pm$ 1.04)	51.2-55.9 (53.0 $\pm$ 1.28)
SN/A	52.5	52.5-57.3 (54.7 $\pm$ 1.40)	56.5-60.2 (58.0 $\pm$ 1.10)
SN/V	26.7	26.7-30.5 (28.2 $\pm$ 1.23)	26.6-29.9 (28.8 $\pm$ 1.04)
CP	24.5	20.9-24.5 (22.6 $\pm$ 0.94)	20.7-23.3 (21.9 $\pm$ 0.85)
D1b	11.6	11.3-12.5 (12.0 $\pm$ 0.35)	11.2-12.8 (12.2 $\pm$ 0.49)
D2b	23.3	23.1-26.9 (24.8 $\pm$ 1.32)	20.5-22.9 (21.6 $\pm$ 0.83)
D1/2	7.8	5.9- 8.3 ( 7.2 $\pm$ 0.77)	7.2- 9.3 ( 8.5 $\pm$ 0.64)
Ab	23.0	21.2-24.1 (22.7 $\pm$ 0.91)	19.2-22.0 (20.4 $\pm$ 0.85)
C1	24.5	24.4-27.0 (25.5 $\pm$ 0.79)	19.3-23.3 (21.8 $\pm$ 1.31)
P1	19.2	19.2-23.1 (21.0 $\pm$ 1.04)	18.1-21.1 (20.0 $\pm$ 0.84)
V1	27.0	24.0-27.0 (25.0 $\pm$ 1.13)	23.7-25.3 (24.4 $\pm$ 0.49)
Vd	17.6	15.1-19.5 (17.7 $\pm$ 1.17)	15.6-18.8 (17.0 $\pm$ 0.89)
Ad	18.0	15.7-18.5 (17.5 $\pm$ 0.97)	14.6-18.2 (16.3 $\pm$ 0.95)
Aw	10.2	10.0-11.9 (10.6 $\pm$ 0.54)	8.3-10.4 ( 9.3 $\pm$ 0.56)
CPd	10.1	8.0-10.1 ( 9.4 $\pm$ 0.57)	8.0- 9.1 ( 8.4 $\pm$ 0.35)
V/AN	22.7	20.8-23.1 (22.3 $\pm$ 0.75)	23.4-27.0 (24.1 $\pm$ 1.10)
%CP,			
CPd	41.1	35.7-45.9 (41.4 $\pm$ 2.89)	34.5-42.6 (38.4 $\pm$ 2.75)
%H,			
SN	24.9	24.3-26.3 (25.7 $\pm$ 1.10)	22.4-25.2 (24.3 $\pm$ 0.92)
E	29.0	25.4-31.2 (28.3 $\pm$ 1.61)	27.6-30.5 (29.4 $\pm$ 0.97)
PO	50.7	46.2-50.7 (48.0 $\pm$ 1.37)	45.9-50.2 (47.7 $\pm$ 1.34)
CHd	23.9	20.0-24.2 (21.9 $\pm$ 1.39)	16.9-21.3 (18.7 $\pm$ 1.48)
Hw	59.9	50.0-59.9 (54.8 $\pm$ 2.92)	44.5-48.1 (46.6 $\pm$ 1.29)
Mw	47.4	37.3-47.4 (42.9 $\pm$ 3.19)	33.4-38.9 (36.4 $\pm$ 2.42)
%E,			
I	25.6	16.9-25.6 (21.1 $\pm$ 3.22)	16.4-20.6 (18.6 $\pm$ 1.39)
%V/AN,			
V	119.1	106.2-119.1 (112.5 $\pm$ 4.39)	91.6-107.8 (101.1 $\pm$ 4.63)

orange/brown spots proximally, white/yellow medially and dark distally. Anal and pelvic fins pale proximally and dark distally. Pectoral fin with yellow/orange spots proximally; base with three dark blotches. Caudal fin with yellow/brown spots proximally and dark distally with light separating band occurring dorsally.

Pigmentation usually heaviest in mature males. Colour more intense in live specimens.



**Figure 4** *Papillogobius punctatus*, holotype, male, 51.1 mm SL, Joel Terrace (Site 13), Swan-Avon Estuary, WA.



**Figure 5** Branchiostegal pigmentation and pelvic disc of *Papillogobius punctatus*, female, 38.2 mm SL.

**Table 3** Meristic variation in *Papillogobius punctatus* from the Swan-Avon Estuary. Individual values are given for the holotype. Range and, in parentheses, mode are given for paratypes and additional specimens. Osteological information was obtained from 52 stained specimens.

Dashed lines indicate data that could not be obtained from type material.

\*20 specimens, left and right arches counted.

Abbreviations used in Tables 3 and 5: A. anal fin; C. caudal fin; D1, D2. first and second dorsal fins; GR. gill rakers on first gill arch; LL. scales in lateral series; P. pectoral fin; PD. predorsal scales; P-VC. relationship between dorsal fin pterygiophores and vertebrae; TR. scales in transverse series; V. pelvic disc; VC. vertebrae.

Counts	Holotype	Paratypes	Range
SL(mm)	51.1	36.3-52.9	28.2-51.3
n	1	19	52
D1	V1	IV-V1 (V1)	V1
D2	1,8	1,7-1,9 (1,8)	1,8
A	1,8	1,8-1,9 (1,8)	1,8-1,9 (1,8)
P	16	15-16 (16)	15-16 (16)
V	1,5	1,5	1,5
C	17	16-17 (17)	17 9/8
LL	30	27-31 (28)	27-31 (30)
TR	7+1	7,7+1, 8 (7+1)	7, 7+1 (7, 7+1)
PD	3	0-5 (0, 1)	0-7 (2)
P-VC	—	—	3/11 11 1 1 0/9
VC	—	—	10,16
GR	—	—	(1-2)+(8-9) (1+8, 2+8)

### Etymology

The species *punctatus* is named after the distinctive red and/or yellow spots which led to its initial separation from *F. lateralis*.

### Distribution

Extensive sampling in several estuaries and coastal embayments throughout the south-west of Western Australia yielded *Papillogobius punctatus* only from the Swan-Avon Estuary (Figure 1).

### Remarks

This goby appears to be restricted to shallow sand flats (up to 2 m in depth) and is often found with *Pseudogobius olorum*. Females and juveniles are more abundant in the shallower water, males are more abundant on the dropoff into deeper water.

Maximum standard length recorded is 52.9 mm for males and 44.2 mm for females, total lengths being 67.1 and 53.8 mm respectively.

### *Favonigobius* Whitley, 1930

*Favonigobius* Whitley, 1930: 122 (Type species *Gobius lateralis* Macleay, 1881).

### Diagnosis

A genus of the subfamily Gobiinae with the following combination of characters: operculum and preoperculum without scales or spines; first spine of dorsal and anal fins

not strengthened; rows a, b, and c of cephalic lateral line single and long; row cp short and joined anteriorly to row c; row d single and short; row e single in two parts; row n single and longitudinal; rows oi, os and ot single and short; rows x1 and x2 well separated; row x absent; caudal fin round.

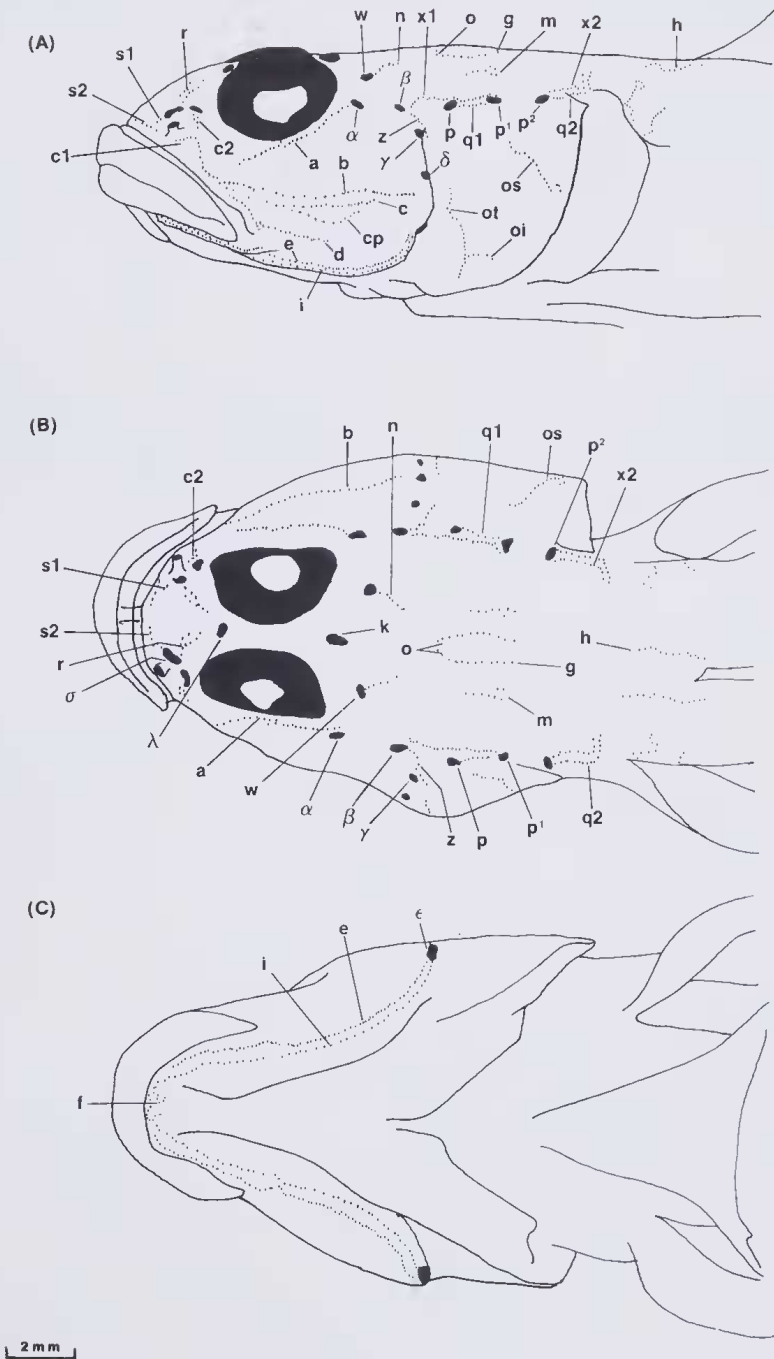
### Description

Body moderately elongate. Eyes dorso-lateral; interorbital space usually less than one eighth eye diameter. First ray of first dorsal occasionally extended and free at tip in males, rarely in females. Second dorsal and anal fins with nine soft branched rays. Caudal fin rounded, usually slightly longer than head. No deepening of caudal peduncle in adults. Pectoral fins without free rays. Pelvic disc complete, posterior edge usually covering genital papilla in females and extending to first branched ray of anal fin in males; anterior membrane complete and well developed. Lateral series with 26-34 ctenoid scales. Predorsal scales 0-8, small, ctenoid and cycloid. Prepelvic scales large and cycloid. Belly scales small and cycloid. Head, opercle and cheek naked. Anterior nostril tubular, without tentacles, posterior nostril pore-like, near orbit. Mouth oblique; jaws equal to subequal, posterior angle of lower jaw between anterior edge of orbit and pupil; chin without barbels or transverse fold. Teeth in jaws erect and caniniform, in several rows medially, outer row of teeth in both jaws enlarged; pharyngeal teeth caniniform. Tongue rounded to truncate. Branchiostegal membrane attached to lateral margin of isthmus to about level of coracoid bar. Gill rakers simple to serrate on first arch, spinulose on rest.

Cephalic lateral line system with anterior and posterior oculoscapular canals carrying pores  $\sigma$ ,  $\lambda$ ,  $\kappa$ ,  $w$ ,  $\alpha$ ,  $\beta$ ,  $p$ ,  $p^1$ ,  $p^2$ , and the preopercular canal carrying pores  $\gamma$ ,  $\delta$  and  $\epsilon$  (Figure 6). Cheek sensory papillae in seven single rows; row a extending from pore  $\alpha$  to anterior edge of orbit; row a1 absent; row b extending from row c to pore  $\delta$  or just below it; row c single and reaching to vertical between pores  $\alpha$  and  $\beta$ ; row cp short, originating from mid region of row c and extending back towards vertical of last few papillae of c; row d extending from row c to between vertical of pores  $\kappa$  and  $\alpha$ ; rows e and i with small break posterior to level of mouth; row f transverse and bearing longitudinal sides; row ot extending to just below or level with pore  $\delta$ ; row oi short; row os short and extending from posterior edge of opercle to between level of pores  $\delta$  and  $\gamma$  and never reaching row ot; row x1 extending from pore p to pore  $p^1$ ; row x2 extending from pore  $p^2$  to above posterior opercular margin; rows q1 and q2 single; row n short and longitudinal; row s1 comprising one to five papillae; row s2 short and single.

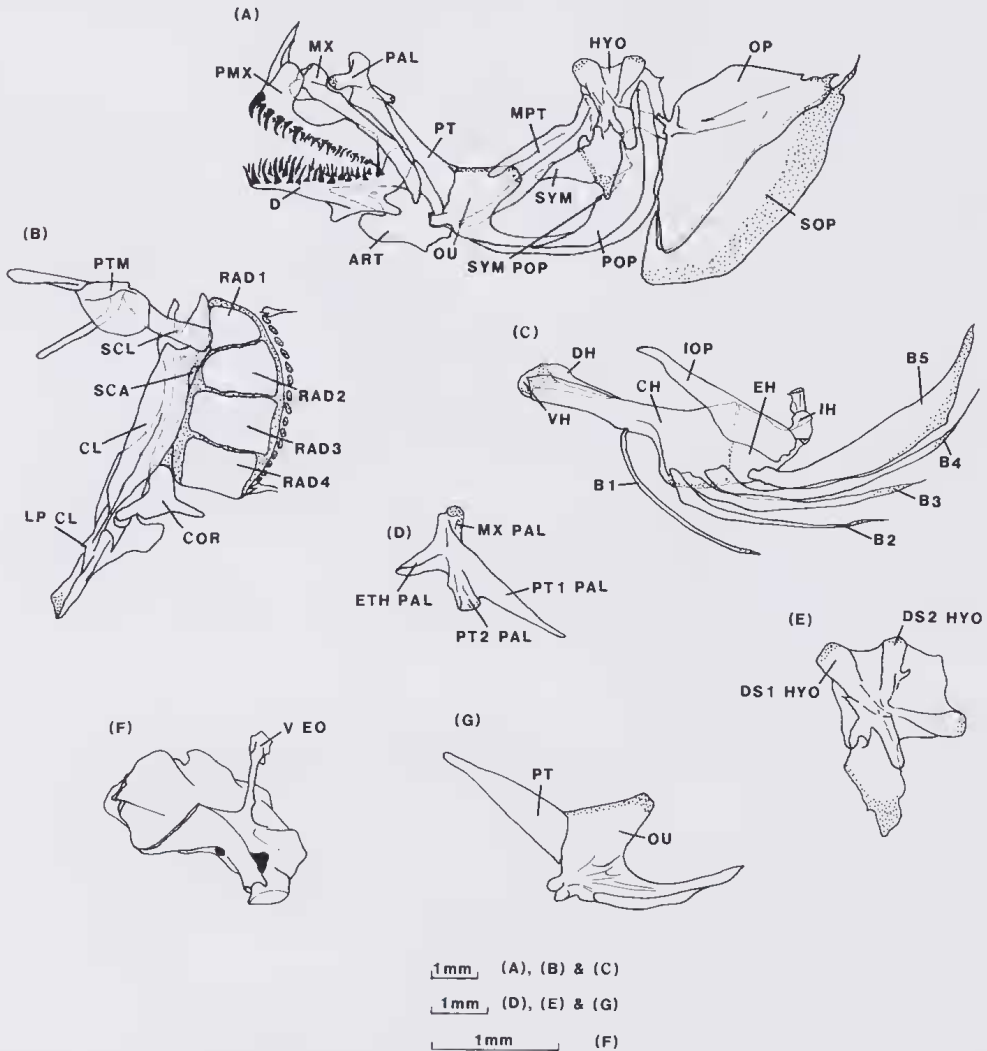
Skeleton possesses characters diagnostic of subfamily Gobiinae (Miller 1973) (Figure 7; for abbreviations see Figure 3).

Ventromedial strut of exoccipital bearing a small foot. Metapterygoid and symplectic fused, tip of metapterygoid overlapping quadrate. Symplectic cartilage bound to hyomandibular and preopercle. Head of palatine bearing posteriorly projecting strut to which tip of ectopterygoid is firmly bound. Ectopterygoid long and reaching to head of palatine. Preopercle bearing remnant of symplectic process. Second branchiostegal



**Figure 6** Cephalic lateral line system in *Favonigobius lateralis*, female, 50.5 mm SL, (A) lateral view; (B) dorsal view; (C) ventral view.

never noticeably broader than branchiostegals three and four. Cleithrum bearing small lateral projection.



**Figure 7** Skeleton of *Favonigobius lateralis*, female, 41.3 mm SL, (A) suspensorium, lateral view; (B) pectoral girdle, lateral view; (C) branchiostegal rays, lateral view; (D) palatine, ventral view; (E) hyomandibular, lateral view; (F) exoccipital, dorsal view; (G) quadrate and ectopterygoid, lateral view.

***Favonigobius lateralis* (Macleay, 1881)**  
(Figures 8 & 9)

*Gobius lateralis* Macleay, 1881: 602 (King George's Sound, Western Australia).

*Rhinogobius lateralis* (Macleay): McCulloch and Waite, 1918: 48, pl. II, fig. 3 (Noarlunga, Semaphore and St. Vincent Gulf, South Australia and Queenscliff, Victoria).

*Rhinogobius (Gobius) lateralis* var. *obliquus* (Macleay): McCulloch and Ogilby, 1919: 249, pl. XXXIV, fig. 4 (Parramatta River estuary and Rose Bay, Port Jackson, New South Wales).

*Favonigobius lateralis* (Macleay): Whitley, 1930: 122.

*Ctenogobius auriga* Whitley, 1959: 317. (D. Hoese pers. comm.)

### Syntypes

AMS I. 16386-001 (2 males, 45.6-48.7 mm SL, 1 female, 45.5 mm SL), King George's Sound, WA.

### Paratypes (var. *obliquus*)

AMS I. 9733-9735 (2 males, 33.1-36.6 mm SL, 3 females, 34.5-44.2 mm SL), Rose Bay, Port Jackson, NSW.

### Additional Material

WAM P.24393-6 (4 females, 45.8-49.6 mm SL), Hardy Inlet, WA; WAM P.24413-7 (2 females, 44.6-45.6 mm SL), Hardy Inlet, WA; WAM P.24900 (2 females, 39.5-50.1 mm SL), Hardy Inlet, WA; WAM P.28806-001 (6 specimens, 25.0-32.0 mm SL), Moreton Bay, Queensland; 40 specimens (20 males, 32.6-54.5 mm SL, 20 females, 35.9-53.4 mm SL), Peel-Harvey Estuary, WA; 12 specimens (2 males, 39.5-46.0 mm SL, 10 females, 35.0-48.8 mm SL), Port Hacking, NSW; 12 specimens (4 males, 29.9-38.9 mm SL, 8 females, 34.3-43.4 mm SL), Rockingham Bay, WA; 103 specimens (67 males, 32.4-55.1 mm SL, 36 females, 28.6-50.5 mm SL), Swan-Avon Estuary, WA. Of these 63 were cleared and stained. Nine of which were subsequently lodged at the Western Australian Museum, WAM P.29736-001.

### Diagnosis

A species of *Favonigobius* with the following combination of characters (mode in parentheses): predorsal scales 0-7(5); scales in lateral row 26-31(29); gill rakers 1-3 + 7-9 (2+7, 2+8); cephalic lateral line f transverse with longitudinal sides.

### Description

Body proportions are given in Table 4; other features as for genus. Body moderately elongate, laterally compressed towards tail and highest at middle of first dorsal fin. Postorbital profile shallow. Snout oblique, shorter than eye diameter.

Fin ray and scale counts are given in Table 5. First dorsal fin (D1) arising above proximal third of pectoral fin; last ray arising above distal quarter of pectoral fin; D1 1 occasionally free at tip and extending to middle of second dorsal fin (D2). D2 commencing above distal half of genital papilla; last ray above vertical of last anal ray and tip extending to at least distal quarter of caudal peduncle and often well into proximal half of caudal fin. Anal fin commencing below D2 1/2; tip of last ray just in advance of posterior tip of D2. Pectoral fin extending back to between D1 V1 and origin of D2 and occasionally to D2 1. Pelvic disc extending at least to tip of genital papilla and often to A 1 in males and to base of genital papilla and often to tip in females. Caudal fin rounded and usually slightly longer than head.

*Colour*: Preserved specimens red-brown to olive green dorsally and pale ventrally. Lateral series bearing five dark blotches; individual blotches appearing as ten dashes in var. *obliquus*; smaller blotches may be present between main blotches. Triangular dark bar extending from eye to middle of upper jaw; triangular dark bar extending from posterior edge of orbit to angle of jaw. Large triangular blotch running along preopercular margin of operculum. Branchiostegal pigmentation may be heavy but not localised (Figure 10). Cheek, preoperculum and operculum with pale nacreous

vermiculations. Abdomen of males bearing pale streaks in some populations. Dorsal fins with series of brown, grey or black reticulating lines; D1 bearing dark spot between D1 I and D1 II, particularly prominent in females. Anal and pelvic fins pale proximally and dark distally. Fine rows of melanophores bordering pectoral fin rays. Caudal fin bearing series of brown, grey or black transverse reticulating lines.

Pigmentation usually heaviest in males.

**Table 4** Body proportions of *Favonigobius lateralis* from the Swan-Avon Estuary. Range and, in parentheses, mean  $\pm$  standard deviation are given.

Sex	Males		Females	
SL(mm)	38.7-55.0		40.6-46.6	
n	10		10	
%SL,				
H	22.7-26.2	(24.6 $\pm$ 1.06)	24.0-26.2	(25.3 $\pm$ 0.85)
Hw	11.3-14.4	(12.9 $\pm$ 0.88)	12.4-14.2	(13.3 $\pm$ 0.50)
Mw	9.9-12.0	(10.0 $\pm$ 0.67)	9.2-10.8	(10.0 $\pm$ 0.58)
SN/D1	29.5-32.7	(31.6 $\pm$ 0.94)	32.3-34.6	(33.9 $\pm$ 0.72)
SN/D2	50.0-52.0	(51.0 $\pm$ 0.62)	52.9-55.0	(54.3 $\pm$ 0.69)
SN/AN	46.5-50.4	(47.8 $\pm$ 1.12)	47.4-51.0	(49.8 $\pm$ 1.25)
SN/A	49.8-55.1	(52.0 $\pm$ 1.58)	53.0-58.0	(54.9 $\pm$ 1.48)
SN/V	25.3-27.7	(26.7 $\pm$ 0.69)	24.7-28.4	(27.0 $\pm$ 1.00)
CP	19.7-22.6	(21.0 $\pm$ 1.02)	19.2-21.3	(20.3 $\pm$ 0.75)
D1b	11.4-13.5	(12.1 $\pm$ 0.68)	11.9-14.1	(12.7 $\pm$ 0.65)
D2b	26.6-29.1	(27.9 $\pm$ 0.82)	25.4-27.4	(26.6 $\pm$ 0.61)
D1/2	6.1- 8.1	( 7.3 $\pm$ 0.64)	6.7- 9.4	( 7.8 $\pm$ 0.77)
Ab	26.1-28.7	(27.2 $\pm$ 0.81)	23.4-26.9	(25.0 $\pm$ 1.02)
C1	25.5-29.9	(27.7 $\pm$ 1.27)	24.5-27.6	(26.3 $\pm$ 1.17)
P1	18.7-24.6	(20.9 $\pm$ 1.68)	21.4-24.4	(23.0 $\pm$ 1.01)
V1	23.0-27.2	(25.5 $\pm$ 1.31)	24.3-27.8	(26.2 $\pm$ 1.36)
Vd	14.8-18.3	(16.4 $\pm$ 1.13)	16.0-17.6	(17.0 $\pm$ 0.57)
Ad	13.9-17.0	(15.6 $\pm$ 0.91)	15.0-17.3	(15.9 $\pm$ 0.82)
Aw	9.1-10.8	( 9.9 $\pm$ 0.49)	7.9-10.5	( 9.3 $\pm$ 0.79)
CPd	8.0- 9.4	( 8.5 $\pm$ 0.43)	7.6- 8.2	( 7.9 $\pm$ 0.16)
V/AN	20.2-25.1	(21.1 $\pm$ 1.44)	19.9-23.7	(22.8 $\pm$ 1.14)
%CP,				
Cpd	36.9-45.0	(40.8 $\pm$ 2.94)	36.5-41.2	(38.8 $\pm$ 1.56)
%H,				
SN	20.3-26.0	(22.3 $\pm$ 1.92)	20.5-24.6	(23.2 $\pm$ 1.50)
E	27.1-31.9	(29.6 $\pm$ 1.63)	27.5-30.7	(29.5 $\pm$ 1.13)
PO	48.0-54.9	(52.0 $\pm$ 2.50)	47.6-55.8	(51.5 $\pm$ 2.11)
CHd	21.0-26.0	(23.7 $\pm$ 1.67)	18.7-23.4	(21.0 $\pm$ 1.65)
Hw	45.6-57.4	(52.3 $\pm$ 3.65)	47.2-54.8	(52.6 $\pm$ 2.44)
Mw	39.3-47.9	(42.5 $\pm$ 2.75)	34.9-42.5	(39.5 $\pm$ 2.37)
%E,				
I	10.6-16.1	(13.8 $\pm$ 1.90)	11.5-14.2	(12.8 $\pm$ 0.91)
%V/AN,				
V	100.0-132.2	(121.1 $\pm$ 9.59)	103.4-136.4	(115.4 $\pm$ 10.38)



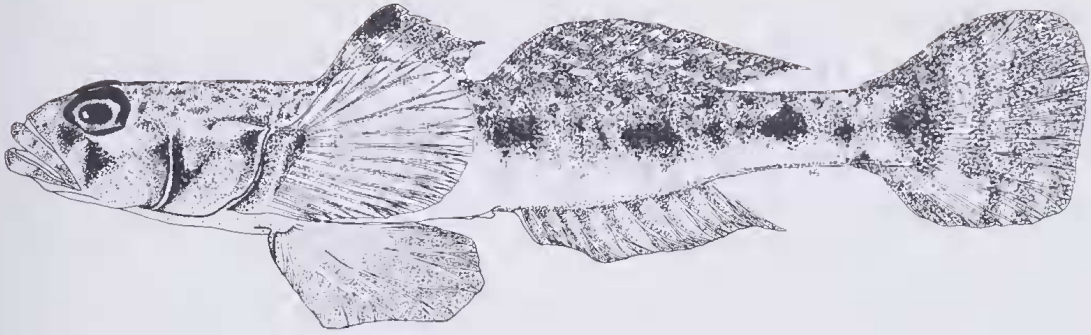


Figure 8 *Favonigobius lateralis*, female, 50.5 mm SL, Leeuwin (Site 2), Swan-Avon Estuary, WA.

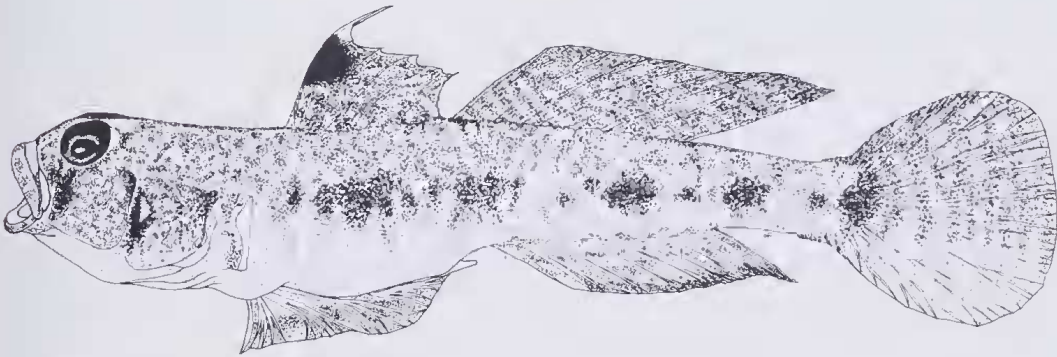


Figure 9 *Favonigobius lateralis*, male, 53.5 mm SL, Leeuwin (Site 2), Swan-Avon Estuary, WA. Pectoral fin removed to show pigmentation on belly and flank of males.

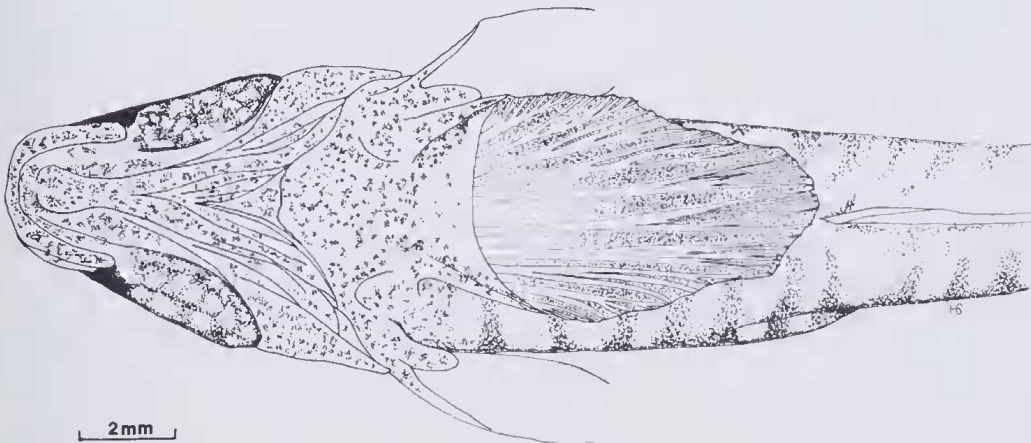


Figure 10 Branchiostegal pigmentation and pelvic disc of *Favonigobius lateralis*, male, 41.0 mm SL.

**Table 5** Meristic variation in syntypes of *Favonigobius lateralis*, paratypes of *F. lateralis* var. *obliquus* and *F. lateralis* from the Swan-Avon Estuary. Range and, in parentheses, mode are given. Osteological data was obtained from 63 stained specimens. Dashed lines indicate data that could not be obtained from type material.

\*20 specimens, left and right arches counted.

**Note:** scale counts for syntypes and paratypes are best estimates, due to loss of scales on most specimens.

Counts	Syntypes	Paratypes	Range
SL(mm)	45.5-45.6	34.5-44.2	28.6-55.0
n	3	5	83
D1	VI	VI	VI
D2	1,9	1,9	1,9
A	1,9	1,9	1,9
P	15-16 (16)	15-16 (15)	14-16 (16)
V	1,5	1,5	1,5
C	16-17 (17)	16-17 (17)	16-17 (17) 9/8
LL	29-31 (29-31)	28-31 (30)	26-30 (29)
TR	8, 8+1 (8+1)	7-8+1 (7)	7-9+1 (8)
PD	1, 2 (2)	2-7 (5)	0-7 (5)
P-VC	—	—	3/11 11 11 0/9
VC	—	—	10, 16
GR	—	—	(1-3)+(7-9) (2+7, 2+8)

### Distribution

*Favonigobius lateralis* occurs in the southern half of Australia, from Denham, WA (25°56'S, 113°32'E) on the west coast, to Moreton Bay, Queensland (27°15'S, 153°15'E) on the east coast.

### Remarks

This species has only been collected on shallow sand flats (less than 2 m deep) in estuaries and coastal embayments subjected to minimal wind and wave action. It has never been caught with large numbers of any other gobiid species.

**Table 6** Comparison of the main characters used to distinguish between *Papillogobius punctatus* and those species currently assigned to *Favonigobius* which bear the generic characters of *Papillogobius*.

Character	<i>Papillogobius punctatus</i>	<i>Favonigobius reichei</i>	<i>Favonigobius melanobranchus</i>	<i>Favonigobius exquisitus</i>
row e	in 2 parts	continuous	continuous	usually cont.
rows x1 & x2	contiguous	usually sep.	separate	usually sep.
branchiostegals	black, meet below rear of preopercle	pale, meet below edge of eye	black, meet below rear of preopercle	pale, meet below edge of eye
snout	steep	shallow	steep	steep
bar from eye	60° to body	40° to body	60° to body	60° to body
PD	0-7	0-3	0	4-10
LL	27-31	26-29	27-29	28-32
GR	(1-2)+(8-9)	1+(6-8)	1+(7-8)	(1-2)+(7-9)

## Discussion

*Papillogobius* and *Favonigobius* possess the osteological and canal pore characters described by Miller (1973) as diagnostic of the subfamily Gobiinae, namely: one epural bone, fan-hypurals not fused, five branchiostegal rays, four pectoral radials, metapterygoid bridge between hyomandibular and quadrate, preopercular process to symplectic, no scapula and preopercular canal with three pores. Both genera are allied to approximately 30 genera with 26 vertebrae, a pterygiophore formula of 3/11 II II 11 0/9 and a full longitudinal papillae pattern. Within these genera, both *Papillogobius* and *Favonigobius* are most closely related to *Acentrogobius*, which has been recognised as a polyphyletic genus by several workers (e.g. Koumans 1953, Hoese and Winterbottom 1979, Hoese 1983). Hoese (1983) recognised two groups within this genus, one being characterised by a proliferated papillae pattern and including the type species *Acentrogobius viridipunctatus* (Cuvier and Valenciennes) and the other having a simple papillae pattern and typified by *Acentrogobius janthinopterus* (Bleeker). Comparisons of selected characters for these two groups and *Papillogobius* and *Favonigobius* are given in Table 1. The main osteological differences between the three genera are:

*Branchiostegal rays.* *Papillogobius* possesses a second branchiostegal ray which is much broader than rays three and four. *Favonigobius* and *Acentrogobius* have rays two, three and four roughly equal in width.

*Cleithrum.* *Papillogobius* has a pronounced, laterally-projecting process which becomes T-shaped in cross section distally on the ventral third of the cleithrum. The process is small and not T-shaped in *Favonigobius* and greatly reduced or absent in *Acentrogobius*. A broad second branchiostegal and cleithrum with a large process were considered by Murdy (1983) to be the derived states of these characters and diagnostic for the genus *Favonigobius*. However, Murdy's diagnosis of *Favonigobius* was based on *F. reichei* and not on the type species *F. lateralis*.

*Symplectic process of preopercle.* The process is well developed in *Papillogobius*, often extending to the symplectic. This process is small in *Favonigobius* and absent in *Acentrogobius*. Miller (1973), Birdsong (1975) and Murdy (1983) all noted the importance of the symplectic process in gobiid systematics and considered a well developed process to be the generalized state.

In addition to the osteological differences, *Papillogobius*, *Favonigobius*, *A. viridipunctatus* and *A. janthinopterus* can be easily distinguished from one another and other gobiids by their characteristic cephalic lateral line systems. The main distinguishing characteristics are:

*Rows a, c and cp.* In *Papillogobius*, the papillae in these rows are proliferated and disorganised and appear as broad swathes of papillae rather than discrete rows. The papillae are proliferated in *A. viridipunctatus* but not disorganised and each row appears as a series of transverse lines. No proliferation of papillae occurs in either *Favonigobius* or *A. janthinopterus*.

*Rows e and i.* These rows are single in *Papillogobius*, *Favonigobius* and *A. janthinopterus* but are proliferated in *A. viridipunctatus*.

*Row n.* This row is single and longitudinal in *Papillogobius* and *Favonigobius*. In *A. viridipunctatus* and *A. janthinopterus*, this row is transverse and proliferated.

*Row x.* This row is present in *Papillogobius*, *A. viridipunctatus* and *A. janthinopterus* and absent in *Favonigobius*.

The six species currently assigned to the genus *Favonigobius*, in addition to the type species *F. lateralis*, are *F. exquisitus*, *F. melanobranchus*, *F. reichei*, *F. gymnachen*, *F. suppositus* and *F. tamarensis*. The first three of these species all bear a papillae pattern similar to that of *Papillogobius*, have a broad second branchiostegal, a large symplectic process, a T-shaped process on the cleithrum and a ventromedial strut on the exoccipital whose foot is either greatly reduced or absent. On the basis of these characters, *F. exquisitus*, *F. melanobranchus* and *F. reichei* are placed in the genus *Papillogobius*. Table 6 gives the characters used to distinguish the four members of this new genus. A complete revision of the genus *Favonigobius*, in which the use of the cephalic lateral line system as a systematic character is fully discussed, is currently in preparation (Gill unpublished data).

#### Comparative material

*Acentrogobius viridipunctatus* (Cuvier and Valenciennes, 1837): PJM coll. No. 0 (3 males, 38.0-66.0 mm SL, 1 female, 60.0 mm SL). PJM coll. No. 4 (2 females, 50.0-57.8 mm SL).

*Arenigobius bifrenatus* (Kner, 1865): WAM P.11959-62 (2 males, 58.6-73.6 mm SL, 2 females 64.4-71.7 mm SL), Preston Point, Swan River, WA, collected by R.J. Slack *et al.*, 18 January 1965; WAM P.16758 (1 male, 88.9 mm SL), Moore River, WA, collected by N. Cross, 7 June 1969; WAM P.24388-92 (3 males, 52.7-82.2 mm SL, 1 female 50.6 mm SL, 1 juvenile, 38.7 mm SL), Hardy Inlet, WA, 26 March 1974; WAM P.25064-005 (1 male, 91.3 mm SL), Hardy Inlet, WA, 20 March 1974; PJM (2 males, 68.6-88.7 mm SL, 4 females, 70.1-80.7 mm SL), Swan River, WA.

*Arenigobius frenatus* (Gunther, 1861): AMS I.19896-002 (1 male, 56.8 mm SL, 3 females, 35.5-57.4 mm SL).

*Bathygobius andrei* (Sauvage, 1880): PJM 1461 (1 male, 107.3 mm SL, 1 female 65.0 mm SL), collected by Dawson, 1984; PJM 1469 (3 females, 67.3-89.0 mm SL), collected by Dawson, May 1984.

*Bathygobius cyclopterus* (Cuvier and Valenciennes, 1837): PJM (3 males, 56.9-61.4 mm SL, 3 females, 43.7-54.6 mm SL), Port Shelta, Hong Kong, 28 July 1983.

*Bathygobius fuscus* (Ruppell, 1830): PJM (3 males, 44.1-52.9 mm SL, 3 females, 38.0-44.4 mm SL), Kat-O shore, Hong Kong, 2 June 1966.

*Bathygobius soporator* (Cuvier and Valenciennes, 1837): GCRL V72:9987 (3 males, 56.1-74.3 mm SL, 3 females, 35.9-51.7 mm SL), Boca del Rio Cienquita, Golfo de Honduras, Cortes, Honduras, 19 June 1971.

*Cristatogobius cristatus* (Day, 1873): WAM P.28812-001 (1 female, 64.4 mm SL), Moreton Bay, Queensland, collected by V. Wadley & P. Young, 28 September 1974; WAM P.28837-005 (1 female, 32.3 mm SL), Port Hacking, NSW.

*Drombus* sp.: PJM (1 male, 42.8 mm SL), Lizard Island, Queensland, 15 September 1981.

*Exyrias bellissimus* (Smith, 1959): WAM P.27662-030 (1 specimen, 74 mm SL), south end of lagoon, Clerke Reef, Rowley Shoals, WA, collected by G. Allen, 23 July 1982; WAM P.29054-003 (1 specimen, 77 mm SL), West Island, Ashmore Reef, Timor Sea, collected by G. Allen, 17 September 1986.

*Exyrias janthinopterus* (Bleeker, 1852): PJM, 1 specimen, Lizard Island, Queensland, 15 September 1981.

*Exyrias puntang* (Bleeker, 1851): WAM P.25231-004 (5 specimens, 30-77 mm SL), Ambon, Molucca Island, Batu Kuning Stream, Kutekote, collected by Allen and Randall, 19 January 1975; WAM P.26955-001 (2 specimens, 55-60 mm SL), Mowbray River, road crossing near Mossman, Queensland, collected by G. Allen and D. Hoese, 13 September 1980; WAM P.29595-025 (4 specimens, 37-93 mm SL), Madang, PNG, collected by G. Allen and L. Parenti, 29 September 1987; PJM (3 males, 56.8-85.1 mm SL, 3 females, 41.0-82.6 mm SL), Lizard Island, Queensland, 15 September 1981.

*Favonigobius exquisitus* (Whitley, 1950): AMS IB.1413, holotype, 46.1 mm SL, Toukley NSW, collected by W. Barnes, 20 March 1945; AMS I.17355-004 (10 males, 30.5-46.5 mm SL, 10 females, 28.0-36.4 mm SL, 10 unsexed), Sugar-loaf Bay, NSW, collected by L. Collett *et al.*; AMS I.25396-002, 2 specimens, Cowan Creek, NSW, collected by J. Bell 4 December 1984; 18 specimens (8 males, 26.0-36.6 mm SL, 10 females, 31.0-38.5 mm SL), Rozzell Bay, NSW, osteological data were taken from 5 specimens.

*Favonigobius melanobranchus* (Fowler, 1934): RUSI 10149 (1 male, 21.9 mm SL), Kosi Bay, Zululand, osteological data taken; WAM P.25667-005 (9 males, 22.3-25.9 mm SL, 2 females, 22.3-22.9 mm SL), Pt. Warrender, WA.

*Favonigobius reichei* (Bleeker, 1853): RMNH 4672 (1 female, 44.0 mm SL), Padang, Sumatra, 1853, leg. M.T.H. Reiche, Bleeker Collection; RUSI 74-80 (1 male, 34.1 mm SL, 3 females 38.1-43.7 mm SL), Inhaca Islands; RUSI 10149 (4 males, 29.2-33.1 mm SL, 10 females, 23.1-37.1 mm SL, 10 juveniles, 16.0-26.7 mm SL), Kosi Bay, Zululand, osteological data were taken from 4 specimens; RUSI 16790 (2 males, 32.0-34.8 mm SL, 2 females, 23.3-33.8 mm SL), Mahe, Seychelles.

*Favonigobius suppositus* (Sauvage, 1880): WAM P.26019-001 (1 male, 74.6 mm SL, 1 female, 72.4 mm SL), Denmark River, WA; WAM P.3054 (1 male, 71.1 mm SL), Gin Gin Brook, WA; WAM P. 21755 (1 female, 59.1 mm SL), Gin Gin Brook, WA; WAM P.24820 (1 male, 71.7 mm SL), Hardy Inlet, WA; WAM P.1815-7 (2 males, 43.0-44.7 mm SL), Harvey River, WA; WAM P.14187 (1 male, 65.9 mm SL), Moore River, WA; WAM P.27026-001 (1 female, 73.8 mm SL), Moore River, WA; WAM P.25069-001 (1 male, 83.4 mm SL), Yunderup, WA; 73 specimens, (31 males, 33.7-58.1 mm SL, 42 females, 28.6-81.0 mm SL) Swan River, WA, 53 specimens were cleared and stained, osteological data were taken from 46 and 7 are lodged at the Western Australian Museum, WAM P.29738-001; 1 specimen (male, 53.2 mm SL), Peel-Harvey Estuary, WA; 1 specimen (female, 59.4 mm SL), Princess Royal Harbour, Albany, WA; 3 specimens (females, 67.3-79.9 mm SL), Swan River, WA; 1 specimen (male, 50.6 mm SL), Warren River, WA.

*Favonigobius tamarensis* (Johnston, 1883): 2 specimens (1 male 39.9 mm SL, 1 female, 45.8 mm SL), Botany Bay, NSW; 4 specimens (females, 24.5-41.7 mm SL), Margate, Tasmania. Osteological data were taken from all specimens.

*Glossogobius aureus* Akihito and Megura, 1975: PJM H.B. (2 males, 132.0-132.5 mm SL).

*Glossogobius biocellatus* (Cuvier and Valenciennes, 1837): PJM (1 female, 52.8 mm SL), Gazi, Kwale District, Kenya, 20 August 1982.

*Glossogobius giurus* (Hamilton, 1822): WAM P.25424-010 (5 specimens, 35-112 mm SL), Station C5-1, Drysdale River, WA, collected by B. Hutchins, 19 August 1975; WAM P.25867-003 (10 males, 48.7-80.7 mm SL, 10 females, 68.3-76.0 mm SL), Maitland River, WA; PJM H.B. (4 females, 64.8-132.5 mm SL).

*Glossogobius olivaceus* (Temminck and Schlegel, 1845): PJM (4 males, 103.5-123.8 mm SL, 2 females, 98.6-107.5 mm SL), Hamana Lake, Japan, 1983.

*Glossogobius sparsipapillus* Akihito and Meguro, 1976: PJM coll. No. 6 (2 males, 94.5-96.7 mm SL).

*Glossogobius tenuiformis* Fowler, 1934: RUSI 24741 (1 male, 37.7 mm SL, 4 females, 30.7-38.7 mm SL), Pongolo Floodplain.

*Glossogobius* sp.: PJM coll. No. 6 (1 female, 88.4 mm SL).

*Hazeus baliuris* (Cuvier and Valenciennes, 1837): PJM (1 male, 49.1 mm SL), Gulf of Thailand, 1964; PJM (2 males, 67.5-68.7 mm SL, 5 females, 65.0-80.7 mm SL).

*Istigobius ornatus* (Ruppell, 1830): WAM P.27274-025 (17 specimens, 39-67 mm SL), Gantheume Point, Broome, WA, collected by N. Sarti and R. Kelly, 18 January 1981; PJM (5 males, 33.9-42.2 mm SL, 3 females 37.0-53.9 mm SL), Kuste vorden Leuchtturm der Altstadt, Galle, 6 February 1981; PJM (2 males, 72.0-84.3 mm SL).

*Istigobius "hongkongensis"*: PJM (3 males, 69.3-74.0 mm SL, 3 females, 52.7-58.9 mm SL), Sharp Island, Hong Kong, collected by W. L. Chan, 27 April 1965.

*Lesueurigobius friesii* (Malm): PJM (2 males, 63.6-66.9 mm SL), Irish Sea, west of Isle of Man, 27 May 1952; PJM (2 males, 67.0-67.6 mm SL, 3 females, 58.3-68.7 mm SL), NW Brada, 20 May 1960.

*Oplopomops atherinoides* (Peters, 1855): PJM (1 specimen, 34.0 mm SL), Malne, 30 September 1954.

*Oplopomus caninoides* (Bleeker, 1852): PJM (1 male, 43.1 mm SL, 1 female, 46.6 mm SL), Momboza, collected by P. Keay, June 1985.

*Oplopomus oplopomus* (Cuvier and Valenciennes, 1837): WAM P. 25168-014 (1 female, 64.6 mm SL), Shark Bay, WA.

*Oplopomus* sp.: WAM P.23350-001 (1 female, 55.6 mm SL), Exmouth Gulf, WA.

*Parkraemeria ornata* Whitley, 1951: AMS I.26707-001 1 specimen, south bank, Lake Merimbula, 300 m above bridge, NSW, 17 March 1976; AMS I.27222-001 3 specimens, Shelley Beach, north of Townsville, Queensland, 1978.

*Parachaeturichthys polynema* (Bleeker, 1853): PJM (1 male, 76.5 mm SL, 4 females, 63.5-84.2 mm SL), Plover Cove, Hong Kong, May 1967.

*Porogobius* sp.: PJM 1 specimen, Port Hearcourt, Nigeria.

*Silhouettea dotui* (Takagi, 1957): PJM (1 female, 41.3 mm SL), Teradomari, Santo-gun, Niigata Prefecture, Japan, 17 August 1980; PJM (1 male, 34.6 mm SL), Hichirinagahama, Aomoki Prefecture, Japan 1 September 1980.

*Yongeichthys caninus* (Cuvier and Valenciennes, 1837): PJM coll. No. 5 (3 males, 83.6-92.1 mm SL, 2 females, 84.5-88.9 mm SL), Thailand.

*Yongeichthys criniger* (Cuvier and Valenciennes, 1837): PJM coll. No. 0 (3 males, 60.7-92.9 mm SL); PJM (1 male, 96.2 mm SL, 4 females, 81.8-97.2 mm SL), Thailand.

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